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Surface plasmon modes management by Thompson plasmonics[1]
NAI JING DENG, CHEUNG WAI CHAU, SAI KIT YUNG, KIN WAH YU, The Chinese University of Hong Kong — We have studied the dispersion and propagation of the surface plasmons in a structure consisting of a metal slab and a dielectric slab, the latter of which contains randomly distributed small metal particles. In our model, the metal material is characterized by the Drude model and the pudding structure is studied with Maxwell-Garnett effective medium theory. This construction of material can bring a new hybridized band in the dispersion relation where light has a relatively small group velocity. The geometric profile of volume fraction of metal balls in pudding structure can effectively change the behaviour of the plasmon propagation. For example, by adding a parabolic confinement, it is shown by the Hamiltonian optics that the light propagation is trapped, i.e., the light experiences an oscillation in a small space. Experimentally, the confinement condition can be achieved with various means, thus it may be useful in development of new mechanism of solar cell.

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